

# CROP TREE RELEASE OPTIONS FOR YOUNG HARDWOOD STANDS IN NORTH CAROLINA

Jamie L. Schuler and Daniel J. Robison<sup>1</sup>

## Poster Summary

### INTRODUCTION

Harvesting southern hardwood forests using even-aged reproduction methods commonly regenerate new stands with 20,000 to 50,000 stems per acre. Overstocking and an overabundance of non-commercial tree species are considered major constraints to growing productive and valuable hardwoods. Crop tree release practices have been promoted as an efficient way of thinning young, overstocked stands since only select individuals are released. Efficiency is gained by releasing only those trees to be carried through to the end of the rotation, leaving areas with no desirable crop trees untreated.

### METHODS

Three mixed species, even-aged upland Piedmont hardwood stands on the North Carolina State Hill Demonstration Forest in Durham Co., NC, had completed 6, 8, and 11 growing seasons at the time of treatment. Site indices for the three sites were  $SI_{50} 75 \pm 5$  feet for red oak. Release treatments specifically targeted yellow-poplar (*Liriodendron tulipifera* L.), red oak (*Quercus rubra* L., *Q. falcata* Michx., and *Q. coccinea* Muench.), and white oak (*Q. alba* L.) species. The release treatments imposed in the spring 1999 were as follows: (1) CON (control); (2) M (manual release)- the mechanical release of selected crop trees to a radius of 6 feet or 30 percent of crop tree height, whichever was greater; (3) 2M (repeated manual release)- same as in treatment M but also repeated after two growing seasons; (4) M+H (manual and herbicide release)- same as in treatment M, plus a 50 percent Garlon in water application to the cut stumps; and (5) M+H+F (manual and herbicide release plus fertilization)- same as in treatment M+H, plus the equivalent of 150 pounds N per acre and 50 pounds P per acre around each study tree.

Several recent studies performed by the Hardwood Research Cooperative (Newton and others 2002, Schuler 2005) have demonstrated substantial responses to fertilization on Piedmont and Upper Coastal Plain hardwood stands. In response to these new data, the initial treatments were modified in the Spring 2002 by adding 150 pounds N per acre to the M, 2M and M+C+F treatments.

### RESULTS AND DISCUSSION

After 6 years, significant treatment effects were noted at all three sites (fig. 1). In general, diameter growth of all three species responded positively to release. The treatments and

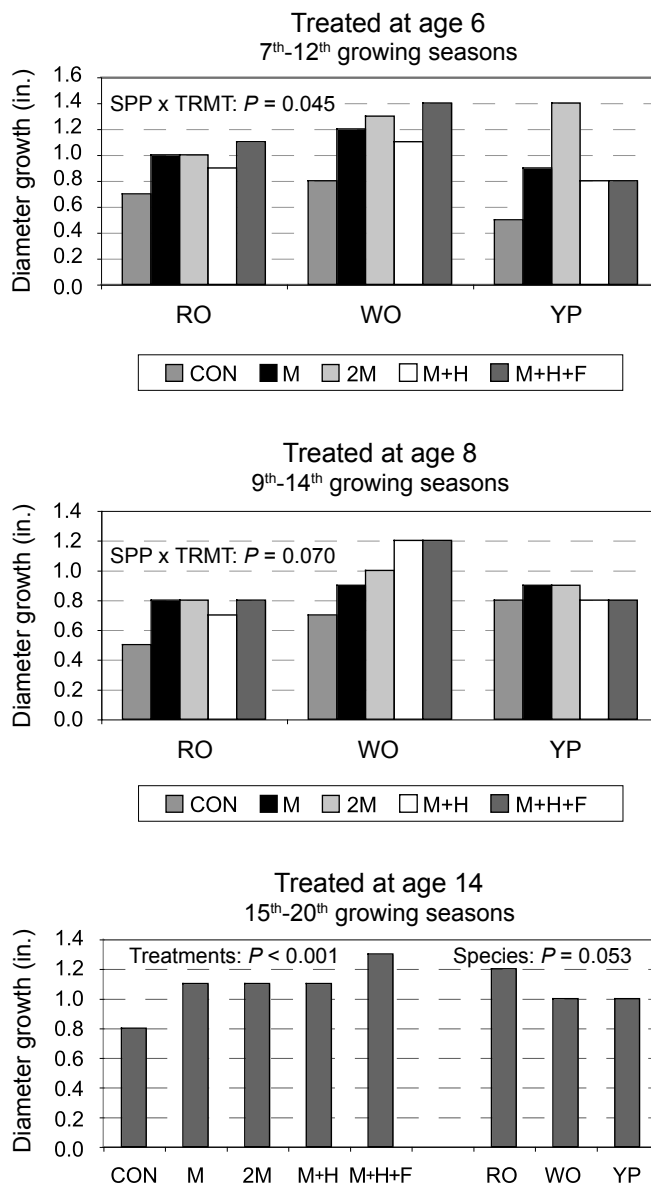


Figure 1—Six year diameter growth response of young upland hardwood stems to crop tree release treatments. Note: Main effects are reported when species x treatment interactions were not significant at  $P=0.10$ . Treatment descriptions are given in the text. RO = red oak, WO = white oak, YP = yellow-poplar.

<sup>1</sup> Assistant Director and Associate Professor/Director, respectively, Hardwood Research Cooperative, North Carolina State University, Raleigh, NC 27695-8008.

species interacted on two of the three sites (Ages 6 and 8). Yellow-poplar showed a greater growth response on the youngest site (Age 6) relative to the control. The 2M treatment provided the best diameter growth across the three sites for yellow-poplar. For the oak species, the M+H+F treatment produced the largest diameter response at each site. Both oak species were responsive at each age.

#### **ACKNOWLEDGMENTS**

The authors thank Peter Birks, Philip Beach, Joe Cox, Jimmy Dodson, Doug Hayes, Karen Hess, Larry Jervis, Corbitt Simmons, and Heather Williams for their assistance in implementing and measuring this study.

#### **LITERATURE CITED**

- Newton, L.P.; Robison, D.J.; Hansen, G.; Allen, H.L., 2002. Fertilization and thinning in a 7 year-old hardwood stand in eastern North Carolina. In: Outcalt, K.W., ed. Proceedings of the 11<sup>th</sup> biennial southern silvicultural research conference. Gen. Tech. Rep. SRS-48. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station: 193-195.
- Schuler, J.L. 2005. Stand dynamics and ecological constraints on growth in young naturally regenerated hardwood stands. Raleigh, NC: North Carolina State University. 149 p. Ph.D. dissertation.